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Method of Preventing Indoor Acari

Y. Nomura, S. Aoki, J. Mesaki, and A. Nishimura  
Earth Pharmaceuticals K.K.

March 22, 1988

Japan Kokai Tokkyo Koho Application, Hei1 - 242502 (1989)

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## Words In Question in

# Japanese (Phonetic)	Page Number (Original)	Tentative Translation	Translated Page Number
<b>Job # BRD-004: Method of Preventing Indoor Acari Japan Kokai Tokkyo Koho Application, Hei1 - 242502 (1989)</b>			
1 konahyo dani	line b5 in p.3L, line 15 and b12 in p. 5L and b4 in p. n) 5R, lines 1 and 15 in p. 6R	konahyo acarus (pl.- n)	3, 6, 8
2 yakehyo dani	line b5 in p. 3L	yakehyo acarus	3
3 hyohi dani rui	line b4 in p.3L	hyohi acarus genus	3
4 kenaga kona dani	line b4 in p.3L and line 6 in p.6L	kenaga kona acarus	3, 8
5 ashibuto kona dani	line b3 in p.3L	ashibuto kona acarus	3
6 kona dani rui	line b3 in p.3L	kona acarus genus	3
7 tsune dani rui	line b3 in p.3L	tsune acarus genus	3
8 empentonn	b18 in p. 4R, Table 1	empentonin	5, 8

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54 Name of Invention: Method of Preventing Indoor Acari

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Detailed Statement

1. Name of Invention

Method of Preventing Indoor Acari

## 2. Range of the Patent Covered

Method of preventing indoor acari in which a carrier holds N,N-diethyl-m-toluanide that evaporates and expels indoor acari.

## 3. Detailed Interpretation of the Invention

### [Industrial Application]

This invention is concerned with the method of preventing indoor acari such as hyohi acarus genus like konahyochi acarus and yakehyohi acarus, kona acarus genus like kenaga kona acarus and ashibuto kona acarus, and tsume acarus genus. The effective chemical which the carrier holds is N,N-diethyl-m-toluanide (represented as Deat below).

### [Traditional Technology]

Recently due to changes in residential and life styles, indoor acari inhabit everywhere all houses in Japan. Such acarus inhabitants in the house not only are uncomfortable but also cause various allergies. Traditionally these indoor acari are stamped out by pyrethroid insecticides or organic phosphorus insecticides in a form of aerosol, powder, ointment and sheet to tatami and carpets.

### [Methods to Solve the Above Problems]

The traditional methods are effective only when acari directly contact areas treated by the insecticide. Thus, the effect is

very limited. In order to increase sufficient effects it is necessary to increase the amount of treatment or treated areas. As a result, not only a great deal of labor and economic burdens are required but also there arise acute poisonings due to high doses of insecticides.

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Thus, this invention is intended to get rid of those problems.

### [Means of The Invention]

This invention is concerned with the method of preventing indoor acari in which a carrier holds N,N-diethyl-m-toluamide that evaporates and expels indoor acari.

Deat is not necessarily superior to other general acarus insecticides. Further, the traditional acarus insecticides have an evasive effect and thus no sufficient residual effect. On the other hand, since it is volatile and permeative, the Deat concentration can be higher in a closed or semi-closed space such as inside of tatami, futon and cushion, closets, areas under a sink, cupboards and drawers than that of the traditional insecticides. In other words, Deat can stamp out acari in a larger space.

Therefore, the present inventors invented the method that a carrier which holds Deat is placed in closets, areas under the sink, cupboards, inside of and beneath tatamis. By this method acari can be swamped out from a large area at one time. Deat can evaporate at room temperature, but if a more quick solution is desired, it may be heated. Further, the treatment of tatamis and beddings could be done in a closed container if necessary.

Materials for the carrier may be papers, glass wool, pulp, textiles such as synthetic and natural textiles, synthetic resins like polyvinyl chloride, polyethylene, polypropylene, and urethane, rubbers such as natural rubbers, silicon rubbers, and neoprene rubbers, inorganic powders such as silicate, kaoline, activated carbon pentnite, loam, talc, and calcium carbonate, plant powders like wood powder and flour, sublimable substances such as tricyclodecaline, cyclododecane, trimethylene norbornene, p-dichlorobenzene, naphthalene, and camphor. These can be used alone or together with others. In the process of production it is possible to add polysaccharides such as starch, carboxymethyl cellulose, hydroxypropyl cellulose to the carrier, or to coat the carrier's surface with synthetic resins like acrylic resins, urethane resins, polyester resins, and polyvinyl acetate resins.

Deat may directly be impregnated into the carrier, or Deat may be dissolved in a solvent or a solvent mixture and the solution may be dropped on the carrier. Or the carrier may be soaked in the Deat or its solution for impregnation.

Further, various other insecticides, insect repellants, germicides, antiseptic agents, fragrance, and coloring agents may be added to the carrier.

Likely insecticides include empenetrin, teraleoline, and DDVP. Insect repellants may be hydroxybutyl anisole and butyl-m-cresol. Germicides and antiseptic agents include PCNX, OPP, BCA, and TBP.

The concentration of Deat in the acarus expellant in the present invention is normally 0.1 ~ 20 wt%, varying with the type of carrier, method of application, and the place applied. The amount

of application of Deat is generally  $300 \text{ mg/m}^3 \sim 700 \text{ mg/m}^3$ , but it is desirable to apply more than  $500 \text{ mg/m}^3$ .

Acarus expellants mentioned above may work either by natural evaporation or by heated evaporation, for example, heating methods such as using electricity, by heat of reaction of calcium oxide with water, or heat of reaction of iron oxidation. p. 5

When the acarus expellant in the invention is used to treat futons and tatamis, futons and tatamis may be wrapped with polymer films such as polyester, cellophane, and polypropylene or with sheets coated with them, and treated by the acarus expellant.

### [Examples]

Below we present our examples and explain more details.

#### Example 1

A solution of Deat in acetone was impregnated in a  $2 \times 2 \text{ cm}$  filter paper. It was dried and placed at the bottom of a sample tube of 50 ml. Next, konahyo acari which were separated from their culture by the heat expulsion method were sent into a nylon girth sack (250 mesh) and the sack was sealed. It was pasted on the inside of the lid of the sample tube. The sample tube was closed and set at  $25^\circ\text{C}$ . Twenty four hours later the tube was taken out, the sack was opened and the numbers of live and dead acari were counted. Three results were averaged and tabulated in Table 1.

As seen in Table 1 Deat was more effective in killing acari than other volatile insecticides generally used since it more easily

evaporated than others.

### Example 2

One g of Deat and 19 g of EVA resin (20 % vinylacetate) were melted and mixed together and molded into a shape of  $100 \times 150 \times 2$  mm. This was taped on a side of the inside of a cupboard. About 200 konahyo acari in a nylon girth sack (250 mesh) were placed in various areas in the cupboard and the cupboard was closed. The cupboard was opened 24 hrs later, and the sacks in it were opened. We examined the number of live and dead acari under a microscope in real size. All acari were dead.

### Example 3

One g of Deat and 4 g of azodicarbonamide as the forming agent were mixed in a powder form and placed in an inner container of a 2 layer container of tin plate. Sixty g of calcium oxide were packed in the outer layer. This was an expellant, which would evaporate by being added by water. This was placed in the storage of  $120 \times 55 \times 45$  cm beneath a sink. Konahyo acari were put in various parts of the storage. Thirty ml of water were added to the outer layer of the container. No live acari were observed 24 hours later.

### Example 4

We made a granular agent by absorbing one part of Deat and 0.1 part of fragrance onto 989 parts of granular silica gel.

A paper bag (untreated) was installed in a commercial electric vacuum cleaner (suction power 160 W). Twenty g of flakes of polyester short fiber were sucked, followed by 10 g of the granular agent mentioned above. Next, the paper bag was taken off from the vacuum cleaner, and about 200 mg of acarus culture, which contained about 1,000 acari, were added to the paper bag. The bag was again installed in the vacuum cleaner and placed under a temperature of 25°C for 3 days. We recovered acari in the paper bag by saturated salt solution floating method. All acari were dead.

#### Example 5

One part of Deat and 99 parts of talc were mixed by stirring, resulting in a powder repellent. Five g of acari culture, which contained about 50,000 kenaga kona acari, were placed in a 30 x 30 tatami and set at 25°C under 74 % RH for proliferation. One week later the culture was taken out and covered with a polypropylene film coated with vinylidene coats. Five g of powder expellant were sprayed at the bottom of the wrap, which was set at 25°C under 74 % RH. Five days later a part of bedding was frayed and the number of live and dead acari were examined by the salt solution floating method. All acari were dead.

#### Example 6

The expellant prepared in Example 1 was inserted between folds of futon folded into three. The whole futon was covered with a polypropylene film, coated with vinylidene coat. Konahyo acari were placed in various places in the wrap as was done

in Example 1.

An examination of alive and dead acari 24 hours later revealed that a sufficient effect was found.

### Example 7

Deat was dissolved in kerosine No. 1 so that the concentration of Deat was around 10 % and the solution was introduced into a plastic container (capacity 50 ml). Sixty parts of perlite, 20 parts of wood powder, and 20 parts of bond were molded into a rod ( $\phi$  7 m/m, length 72.5 m/m). The rod was inserted into the plastic container. The upper part of the rod was heated by a ring PTC heater to about 140°C. The resulting expellent was placed in a storage of 120 × 55 × 45 cm beneath the sink. Konahyo acari were put in various areas. The electricity was on for 12 hours. Acari were examined to see if each acarus was alive or dead 24 hours after the beginning of turning on electricity. All acari were dead.

### Effect of Invention

This invention effectively expelles indoor acari if N,N-diethyl-m-toluamide is held onto a carrier and its vapor fills the desired area.

Patent Applicant: Earth Pharmaceuticals K.K.

Table 1

Chemicals	Amount of Fatality Chemicals	(%)
Deat	0.1	100
Deat	0.5	100
Empentrin	0.5	5
Napthaline	0.5	0
p-Dichlorobenzene	0.5	0
Phenitrothione	0.5	0
Diazinon	0.5	0